

## Yao Yue

Computer Science and Technology

ranusy@gmail.com

FIT 4-106, Tsinghua University

+86-10-62772487 (voice)

Beijing 100084 China

+86-10-62771138 (fax)

### Education

2005.8– **Department of Computer Science and Technology, Tsinghua University, China**

Present Master Student in Computer Science, projected graduation date: July 2007

GPA: **90.1/100** (overall), **92.7/100** (major)2001.9– **Academic Talent Program, School of Science, Tsinghua University, China**

2005.7 Bachelor of Science in Mathematics and Physics, July 2005

GPA: 83.9/100 (overall), 85.5/100 (major), **90.2/100 (CS related)****GRE** Verbal 550 (72%); Quantitative 800 (92%); Analytical Writing 5.0 (71%)**TOEFL** 66/68/67, total 670 **TWE** 5.5

### Research Interest

My primary research is computer networks and distributed systems, especially internet architecture and networked systems targeting enterprise-wide or large-scale deployment. My long term interest resides in building a robust, flexible inter communication infrastructure. To achieve these goals, I would like to gain insight into problems with measurement and analysis, and apply state-of-the-art technologies such as virtualization and machine learning toward better solutions.

### Publications (Paper downloads available online at <http://www.ranusy.net>)

1. **Yao Yue**, Chuang Lin, Zhangxi Tan, "Analyzing the Performance and Fairness of BitTorrent-like Networks Using a General Fluid Model" (full version), **Elsevier Computer Communications**, Volume 29, Issue 18, Nov 2006, pp. 3946-3956
2. **Yao Yue**, Chuang Lin, Zhangxi Tan, "Analyzing the Performance and Fairness of BitTorrent-like Networks Using a General Fluid Model" (conference version), accepted by the 49th annual IEEE Global Telecommunications Conference (**GLOBECOM 2006**), San Francisco, California, Nov 2006.
3. **Yao Yue**, Chuang Lin, Zhangxi Tan, "NPCryptBench: A Cryptographic Benchmark for Network Processors", **ACM SIGARCH Computer Architecture News**, volume 34, issue 1, 2006, pp. 49-56.
4. Zhen Chen, Chuang Lin, Jia Ni, Dong-Hua Ruan, Bo Zheng, Zhang-Xi Tan, Yi-Xin Jiang, Xue-Hai Peng, An-an Luo, Bing Zhu, Yao Yue, Yang Wang, Peter Ungsunan, Feng-Yuan Ren, "AntiWorm NPU-based Parallel Bloom Filters in Giga-Ethernet LAN", Proceedings of the 2006 IEEE International Conference on Communications (**ICC 2006**), Istanbul, Turkey, Jun 2006
5. **Yao Yue**, Chuang Lin, Zhangxi Tan, "NPCryptBench: A Cryptographic Benchmark for Network Processors", MEMory performance: DEaling with Applications, systems and architecture (**ACM SIGARCH MEDEA 2005**), held in conjunction with The Fourteenth International Conference on Parallel Architectures and Compilation Techniques (**PACT 2005**), Saint Louis, Missouri, Sep 2005.
6. Zhen Chen, Chuang Lin, Jia Ni, Dong-Hua Ruan, Bo Zheng, Yi-Xin Jiang, Xue-Hai Peng, Yang Wang, An-an Luo, Bing Zhu, Yao Yue, Feng-Yuan Ren, "AntiWorm NPU-based Parallel Bloom Filters for TCP/IP Content Processing in Giga-Ethernet LAN", Proceedings of The IEEE Conference on Local Computer Networks 30th Anniversary (**LCN 2005**) - Volume 00, pp. 748-755, Sydney, Australia, Nov 2005.

## Software

**NPCryptBench** (China software copyright registration number 2006SRBJ1227) is a software package for implementing and optimizing cryptographic applications on data plane (fast path) of network processor architecture.

**Motivation:** With a growing awareness of communication security, cryptographic processing soars at routers, servers or other nodes on fast path. While software-based solutions have an edge in flexibility over their hardware alternatives, the impact of implementing cryptographic applications on network processors is not yet well studied.

**Description:** NPCryptBench consists of ten cryptographic benchmarks chosen on their popularity, representativeness and availability. It focuses on the inner loops executed by data plane processors, which present the majority of processing time and consumes considerable power.

**Status:** The latest releases run on six models of the Intel IXP 12XX/2XXX Network Processors and introduce three levels of optimized codes for each platform. Two new versions for more recent models of Intel IXP network processors are under active development. So far, nine institutes and universities from four countries have officially requested the package.

For more information about NPCryptBench its users, please visit NPCryptBench Homepage.

**Collaborator:** Zhangxi Tan (UC Berkeley), Donghua Ruan (Tsinghua University)

## Talk

- 2006 Oral presentation of *Analyzing the Performance and Fairness of BitTorrent-like Networks Using a General Fluid Model*, at **Globecom'06**, San Francisco, CA, Nov 30, 2006.

## Research Experiences

- 2006.8-present **Converged Networks Group, IBM China Research Laboratory, Beijing, China**  
Internship in *Performance Evaluation and Optimization of SIP-based Applications on IBM Java Virtual Machine* (Modeling and Experimentation over Test Bed)  
**Motive:** Despite their security advantage and development convenience, performance of servers running SIP-based applications on top of Java virtual machine (JVM) are often questioned, mainly due to the impact of GC. The basic GC policy in IBM JVM can be summarized as a stop-the-world mark-sweep-and-compact strategy. Consequently, GC introduces periodical slow response intervals and message loss.  
**Goal:** 1. To streamline servers specifically for SIP-based applications by tuning a number of JVM policies, such as generational GC, concurrent marking and JVM parameters. 2. Calculate performance degradation curves of an optimized server configuration assuming certain user behavior, and point out the inflection point of performance.  
**Contribution:** A series of experiments over test bed with various JVM settings have been deployed and analyzed. So far, we are able to decide optimal policy configurations under different traffic patterns. A deterministic Petri Net model has also been developed to plot performance degradation curves and to predict the inflection point.
- 2006.3-present **Department of Computer Science and Technology, Tsinghua University, China**  
Graduate Research Assistant in *Enhance unstructured P2P system in Privacy and Security*, a joint program with **Microsoft Research Asia**  
**Motive:** While P2P systems have an edge in scalability, they are often questioned about their fairness, privacy and security. On the other hand, efficiency, fairness and survivability are interwoven in many P2P file sharing systems such as BitTorrent. It is important to realize the interdependency of performance indices, and introduce enhancement into one or more aspects of such applications afterwards.

**Goal:** 1. To point out the how different aspects, such as fairness, survivability, efficiency and etc., are related to each other. 2. To put forward an improved design to enhance efficiency and privacy in BitTorrent like file sharing systems. 3. Provide measurement tools to collect end-to-end performance metrics at low communication cost for a global view of P2P systems.

**Contribution:** Our preliminary research on takes a modeling approach on the dynamic behavior of BitTorrent like networks. The model reveals how fairness and survivability of a P2P file sharing system are related to the more traditional issues like scalability and efficiency. After realizing our first goal, an enhanced interconnecting mechanism has been designed and implemented to improve efficiency, security and privacy, and this mechanism could be applied to general P2P file-sharing systems. Since achieving high security and privacy can often be contradictory, our scheme supports flexible adaptation when a compromise is required. In addition, a measurement tool to study E2E performance and topology is under development to facilitate experiments on P2P applications.

Advisor: Professor and Department Head Chuang Lin

2005.7- **Department of Computer Science and Technology, Tsinghua University, China**

2006.8 Graduate Research Assistant in **Intel IXA University Program** (<http://www.ixaedu.com>)

**Motive:** The functionality and performance of many network security applications rely on an efficient, flexible implementation of cryptographic algorithms on network processors (NPs), especially on data plane (fast path). Necessity of benchmarking cryptographic algorithms on NPs rises in the face of rigid hardware solutions and unclear performance of software-based solutions.

**Goal:** 1. Implementing popular, representative cryptographic algorithms on network processors, with our focus on data-plane. 2. Benchmarking NPs to locate performance bottlenecks. 3. To alleviate the bottlenecks with generic or model-specific optimizations.

**Contribution:** A major developer of NPCryptBench, a cryptographic benchmark suite for network processors. By applying the benchmarks on several NP models we obtain first-hand statistics. With these data performance bottlenecks under different workloads and system configurations are successfully located. Summarized benchmark methodology and optimization guidelines from both software and architecture angles.

Advisor: Professor and Department Head Chuang Lin

2003.9- **State Key Laboratory of Intelligent Technology and Systems, Department of Computer Science and Technology, Tsinghua University, China**

2004.7 Undergraduate research in Decision Theory and Multi-agent Systems

This is a two semester discussion group/seminar whose members study the classical papers on decision theory and game theory used in multi-agent systems. At the end of each semester, I concluded the seminar with a survey essay. I also presented an introductory talk of multi-agent systems to my classmates and a short course in game theory to my graduate colleagues.

Advisor: Professor Mingsheng Ying and Assistant Professor Sanjiang Li

## Teaching Experience

2006.3- Teaching Assistant for **Student Research Training** program in Department of Computer Science,  
present Tsinghua University, China  
Prof. Fengyuan Ren.

## Reviewer

2006 Frontiers on Computer Science in China  
2006 IEEE Journals on Selected Areas in Communications  
2006 The IEEE/ACM Transactions on Networking  
2005 IFIP International Conference on Network and Parallel Computing 2005

## Honors and Awards

- 2006 Friends of Tsinghua - Siemens A&D Scholarship (First Class Scholarship, top 1%)
- 2006 Women of Color Scholarship to attend Grace Hopper Celebration of Women in Computing 2006, San Diego, CA (sponsored by Google and National Science Foundation, less than 60 awarded internationally)
- 2005 Scholarship for the Excellency of Social Services, Tsinghua University
- 2004 Excellent Student Leadership, Tsinghua University
- 2003 Scholarship for the Excellency of Social Services, Tsinghua University
- 2002 Meng Zhaoying Scholarship, Tsinghua University (top 5%)
- 1999-2001 Three Times Huaying Scholarship, Huaying Education Foundation, China
- 1999-2001 Two Times First Prize in National Competition in Informatics, China
- 1999 First place in National Competition in Informatics for high school Students (Jiangsu District, China), Best Female Contestant
- 1999 Bronze Medal in National Olympiad Informatics, China (No.31 nationwide)

## Skills

**Language:** Native in Mandarin, fluent in English, beginning German.

**Programming:** Projects in C/C++, Python, Intel IXP network processor C/ASM, Pascal, Unix shell script  
Familiar with HTML, XML, Perl, Java

**Tools:** Maple, NS2, Gnuplot, LaTeX, OpenSSL, TUN, Iptables, SIPp, TimeNET, SPnP

**Operating Systems:** Linux Administration (Fedora Core, Debian), Windows XP/2003

## Social Activities

- 2005 Assistant of General Chair (Prof. Chuang Lin), ACM SIGCOMM Asia Workshop 2005
- 2003-2005 Network administrator and head of Information Group at Student Network Service, Tsinghua University
- 2002-2003 Vice President of Physics Department Student Union, in charge of sports
- 2002-2005 Four year member of Tsinghua Chorus
- 2002-2006 No.1 in long jump, John Ma Cup 2003  
No.1 in swimming (100m breaststroke) 2006; No.2 in swimming (100m backstroke) 2005  
Captain of Physics Department Basketball Team, rank 8 in John Ma Cup



## References

Prof. Chuang Lin, Department Head  
Department of Compute Science and Technology, Tsinghua University,  
Beijing 100084, China  
+86 10 62783596  
[chlin@tsinghua.edu.cn](mailto:chlin@tsinghua.edu.cn)

Prof. Fengyuan Ren  
Department of Compute Science and Technology, Tsinghua University  
Beijing 100084, China  
+86 10 62772487  
[renfy@csnet1.cs.tsinghua.edu.cn](mailto:renfy@csnet1.cs.tsinghua.edu.cn)